



CHAPTER 3

AIRPORT CAPACITY ANALYSIS AND ENHANCEMENTS

3 Airport Capacity Analysis and Enhancements

The analysis of capacity of the nation's airports is a complex process. The primary determinant of an airport's capacity is its physical design: the number, length and location of runways, intersections, taxiways, gates, and the distance between parallel runways. The FAA works with airports and other aviation industry stakeholders to conduct studies to improve the operating efficiency of the infrastructure.

For the past 15 years, the FAA's Office of System Capacity (ASC) has collaborated with airport authorities and air traffic control facilities throughout the U.S. to analyze alternatives for increasing capacity and reducing delays. This chapter summarizes the progress achieved in the number of studies that are underway.

3.1 Capacity Benchmark Analysis Continues

In 2001, the FAA issued the Airport Capacity Benchmark Report that analyzed capacity at 31 airports—the 30 busiest U.S. passenger airports and Memphis, a major cargo airport. The objective of the Benchmark Report was to document the number of flights these airports can handle under optimum and reduced weather conditions, and to project future capacity based upon plans for new runways, revised air traffic procedures, and technology improvements. Benchmark rates for each airport were estimated by the air traffic controllers for a particular airport based on their experience in handling flights on a daily basis, and calculated using a computer model of airfield capacity. The facility-provided and calculated estimates were compared to historical arrival and departure data to confirm their validity. In addition, FAA representatives visited several of the airports to validate the methodology.

Once these rates were derived, the benchmarks were then compared to air carrier flight schedules to document how frequently scheduled demand exceeds the benchmarks under optimum and reduced weather conditions. While capacity benchmarks can be exceeded for a short period of time without producing a large number of delays, when the number of scheduled flights exceeds the benchmark for sustained periods of time, delays are inevitable.

In 2002, the FAA began to update the Capacity Benchmark Report and increased the number of benchmarked airports to 35. Cleveland, Ft. Lauderdale, Portland and Midway airports were added due to a combination of factors, such as overall passenger activity and expected major increases in capacity. Figure 3.1 shows the operational volume and delay rates at the 35 benchmarked airports for CY 2001.

Figure 3-1 Capacity Benchmark Airport Delay Rate

Airport (ID)	2000 Operations	2001 Operations	Difference	2000 Delay Rate	2001 Delay Rate	Difference
Hartsfield Atlanta International (ATL)	913,449	887,403	-3%	30.90	24.33	-21%
Boston Logan International (BOS)	508,283	471,989	-7%	47.50	34.45	-27%
Baltimore-Washington International (BWI)	315,348	323,771	3%	6.91	5.10	-26%
Cleveland Hopkins International (CLE)	331,899	291,714	-12%	11.43	6.37	-44%
Charlotte/Douglas International (CLT)	460,370	471,155	2%	5.96	5.20	-13%
Greater Cincinnati International (CVG)	477,844	386,388	-19%	15.40	10.21	-34%
Ronald Reagan National (DCA)	342,790	270,145	-21%	7.90	10.50	33%

Figure 3-1 Continued

Airport (ID)	2000 Operations	2001 Operations	Difference	2000 Delay Rate	2001 Delay Rate	Difference
Denver International (DEN)	528,604	507,826	-4%	2.20	3.60	64%
Dallas-Fort Worth International (DFW)	865,777	802,587	-7%	23.83	21.98	-8%
Detroit Metro Wayne County (DTW)	554,580	523,039	-6%	17.60	15.40	-13%
Newark Liberty International (EWR)	457,182	445,082	-3%	81.20	60.28	-26%
Fort Lauderdale-Hollywood International (FLL)	292,462	290,124	-1%	3.74	5.30	42%
Honolulu International (HNL)	345,496	326,994	-5%	0.02	0.12	500%
Washington Dulles International (IAD)	479,931	424,150	-12%	19.45	8.04	-59%
George Bush International (IAH)	490,568	477,367	-3%	28.10	33.02	18%
New York John F. Kennedy International (JFK)	358,951	317,746	-11%	38.80	24.62	-37%
Las Vegas McCarran International (LAS)	521,300	498,970	-4%	8.01	5.36	-33%
Los Angeles International (LAX)	783,684	738,679	-6%	21.87	22.60	3%
New York LaGuardia (LGA)	392,047	376,919	-4%	155.90	76.98	-51%
Orlando International (MCO)	366,278	326,456	-11%	6.27	3.97	-37%
Chicago Midway (MDW)	298,437	276,520	-7%	11.90	8.05	-32%
Memphis International (MEM)	386,335	393,925	2%	0.37	0.88	138%
Miami International (MIA)	516,545	469,871	-9%	11.32	11.28	0%
Minneapolis-St. Paul International (MSP)	522,253	501,252	-4%	12.74	14.46	14%
Chicago O'Hare International (ORD)	908,977	911,861	0%	63.30	59.49	-6%
Portland International (PDX)	317,477	293,902	-7%	0.51	0.30	-41%
Philadelphia International (PHL)	483,567	467,183	-3%	44.50	40.45	-9%
Phoenix Sky Harbor International (PHX)	638,757	606,666	-5%	21.95	15.31	-30%
Greater Pittsburgh International (PIT)	448,181	451,180	1%	3.78	2.69	-29%
San Diego International Lindbergh Field (SAN)	207,916	206,848	-1%	2.50	4.88	95%
Seattle-Tacoma International (SEA)	445,677	400,670	-10%	10.44	20.76	99%
San Francisco International (SFO)	430,554	387,599	-10%	56.90	38.31	-33%
Salt Lake City International (SLC)	366,933	370,282	1%	1.96	2.27	16%
Lambert St. Louis International (STL)	484,224	478,947	-1%	18.24	18.10	-1%
Tampa International (TPA)	278,632	260,859	-6%	1.56	2.76	77%

ASC has conducted capacity enhancement studies at 25 of the 35 benchmarked airports and continues with its plans to improve the operational efficiencies through a combination of airfield construction, enhanced technology, and improved procedures. Following is an update of the studies that have recently been completed or that are underway.

3.2 Airport Capacity Design Team Studies

Design teams are composed of FAA representatives from the Office of System Capacity, Air Traffic, the Technical Center and the regional Airports office, along with representatives from the airport, airlines, and other parties with aviation interests. When the study is completed, the Airport Capacity Design Team issues a Capacity Enhancement Plan (CEP) that presents a list of recommended actions and estimates the impact of each alternative on delays at the airport.

3.2.1 Chicago O'Hare Task Force Study

The Chicago O'Hare Task Force, co-sponsored by the City of Chicago and the FAA, was created in June 2001 to identify options that could be used to reduce flight delays at O'Hare and to examine the merits of each option. The Task Force released its report in June 2002. The alternatives focused on airspace/technology, air traffic control procedures, and collaborative decision-making. The task force examined 82 alternatives, and 47 were identified as alternatives that would improve the operating efficiency of O'Hare and reduce delays. The Task Force findings identified potential benefits ranging from \$300,000 up to \$38.1 million annually at the 2,772 daily operations level. At the 3,400 daily operations activity level, potential savings range from \$3.4 million to \$99.5 million annually.

3.2.2 Baltimore-Washington International Airport

The Baltimore/Washington International Airport Capacity Task Force is conducting a study to determine when a new runway will be needed at BWI airport and to determine which of the alternatives should proceed for further capacity, cost, and environmental study. The team is now in phase three of the project. In 2001, the FAA released an evaluation of each proposed capacity improvement and simulations were conducted to further evaluate impacts associated with capacity solutions. In 2003, the team will update the forecasts, conduct further capacity analysis, develop cost estimates and conduct environmental studies.

3.2.3 Washington Dulles International Airport

Operations at Washington Dulles Airport decreased by 6.6 percent, from 430,082 in FY 2001 to 401,750 operations in FY 2002. Like many U.S. international gateways, traffic recovery at Dulles has been slow. The construction of additional runways will be phased in as demand develops. No new runways have been added at Dulles since it opened in 1962.

Washington Dulles International Airport completed its capacity review and alternatives analysis for the spacing and implementation of a fourth and fifth runways late last year. In addition to the fourth and fifth runways, an extension of the existing crosswind runway to 13,000 feet is being considered. Currently, the longest runway at Dulles is 11,500 feet. The final study includes a recommended airfield layout and a cost estimate.

3.2.4 Airport Air Traffic Ground Control Simulations

ASC is participating in air traffic control ground simulations at Phoenix Sky Harbor International Airport, utilizing the FAA Technical Center's Airfield Delay Simulation Model (ADSIM) and the Airspace Delay Simulation Model (SIMMOD). In 2003, Runway 7L/25R will be closed for 60 days due to construction, and the simulations will assist air traffic controllers in developing the most efficient scenarios for operating aircraft, to determine the best ground route alternatives for arrival and departures.

3.2.5 Portland International Airport

Portland International Airport is ranked 44th in aircraft operations, and is forecast to experience a 26.6 percent increase in operations by 2010, according to 2001 Terminal Area Forecast baseline data. The Port recently decided to adopt low growth forecast figures for decisions regarding the timing of future facility enhancements. Using the Port's local

forecast, the Portland International Airport Capacity Design Team updated its 1996 Capacity Enhancement Plan. The first phase of this multi-phase effort had two goals: one was to evaluate the capacity and delay reduction benefits of the proposed third parallel runway, North/South taxiway, and new technology. The second goal was to determine the delay costs of existing departure noise restrictions. The study was published October 2001, and is available on the ASC web site. The second phase of the study was initiated Fall 2002 and will further analyze the capacity and delay reduction benefits of the proposed third parallel runway by comparing the centralized and decentralized terminal options along with the reconfiguration of associated taxiways. This study is expected to be completed at the end of 2003 with findings included in the following year's ACE Plan.

3.2.6 Santiago, Chile Capacity Enhancement Project

Because the FAA's recognized expertise in evaluating capacity enhancements, foreign operators often ask for assistance. A team comprised of the FAA and the Dirección General Aeronáutica Civil (DGAC) of Chile conducted an evaluation of a proposed DGAC project to increase the capacity of the Arturo Merino Benítez International Airport that was released in January 2002. The FAA conducted an assessment of airport capacity and evaluated the impact of a proposed closing of an existing runway for refurbishments. Additionally, the FAA proposed use of radar procedures and implementation of more extensive use of visual separation standards, to enhance airport capacity models. The team determined that the best option is construction of a new, converging diagonal runway, which will provide coverage for the temporary closing of the main runway closing, as well as provide a long-term benefit to future operations.

3.3 Demand Management Solutions

Demand management involves taking specific actions to reduce, redistribute, or increase aircraft operations to address a particular problem. Conditions that might suggest such a solution include excess demand that results in consistently high levels of flight delay, particularly at an airport with limited expansion possibilities that is significant to the operation of the NAS. Several U.S. airports are "slot-controlled," meaning that the number of flights per day is capped. Conversely, communities that are underserved by airlines may require special measures to ensure that rural communities have access to air service.

3.3.1 Demand Management at LaGuardia

LaGuardia is a slot-controlled airport, which means that the number of take-offs and landings are limited. In 2000, LaGuardia accounted for 25 percent of flight delays nationwide. In 2001, there was a sharp increase in the number of new entrant carriers, and consequently delays, when new legislation increased the number of available slots and increased access to small carriers. To help remedy this situation, a moratorium on new flights was imposed and there was a scale back of the recently added flights. Subsequently, a temporary lottery was instituted. The lottery system gives priority to operators using larger aircraft, and variations of the current slot allocation system would set aside certain slots for service to small communities and possibly new entrants. The FAA has extended the current slot lottery system through October 2004. So far, this solution,

which includes trading and leasing slots, has provided a more efficient allocation system and delays have been sharply reduced.

This lottery extension provides the FAA with more time to establish a long-term demand management system. In 2002, the Port Authority of New York and New Jersey conducted delay reduction studies for LaGuardia and Kennedy airports in cooperation with Capacity Enhancement Task Force made up of representatives from the FAA, airlines, other users, and the Port Authority.